

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) : B01D 24/00, 29/00; B05D 5/00

US CL : 210/490, 502.1, 507; 427/243

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

search terms: particulate, filter, membrane, porous (and related terms)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,728,432 A (SUGIYAMA et al) 01 March 1988, see entire document, especially column 3.	1-19, 21-24, 28 31-33, 37-39
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Y		20, 25-27, 29-30, 34-36
Y	US 3,908,044 A (GUNNING) 23 September 1975, see figures and column 4, line 16 and column 5.	20, 30, 34
Y	US 3,238,056 A (PALL et al) 01 March 1966, see especially columns 5-6.	25-27, 29, 35
X	US 5,071,610 A (HAGEN et al) 10 December 1991, see entire document.	1-11, 37-39

☐ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*A* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

13 SEPTEMBER 1999

Date of mailing of the international search report

22 OCT 1999

 Name and mailing address of the ISA/US  
 Commissioner of Patents and Trademarks  
 Box PCT  
 Washington, D.C. 20231

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/14471

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/14471

## B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

210/490, 502.1, 503, 504, 506, 507; 427/243, 244, 245, 246, 352, 353, 384, 430.1, 434.2, 434.5, 434.7; 264/41, 145, 171.13, 171.25, 280, 286

## BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-11 and 37-39, drawn to a composite membrane.

Group II, claim(s) 12-36, drawn to a method of making a membrane.

The inventions listed as Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The invention of group I (alternately claims 1 and 37-39) does not define a contribution over the prior art as shown by, e.g., US 5,071,610 (HAGEN et al) or US 4,728,432 (SUGIYAMA et al), and the invention of group II (alternately, claim 12) does not define a contribution over the prior art as shown by US 4,728,432 (SUGIYAMA et al), therefore, holding of Lack of Unity of Invention is proper. Applicant elected to pay for all inventions, therefore, this search report encompasses claims 1-39.